

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
4 March 2004 (04.03.2004)

PCT

(10) International Publication Number
WO 2004/017834 A1

(51) International Patent Classification⁷: **A61B 8/08**

(21) International Application Number:
PCT/EP2003/007807

(22) International Filing Date: **1 July 2003 (01.07.2003)**

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:
0218547.8 9 August 2002 (09.08.2002) GH

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

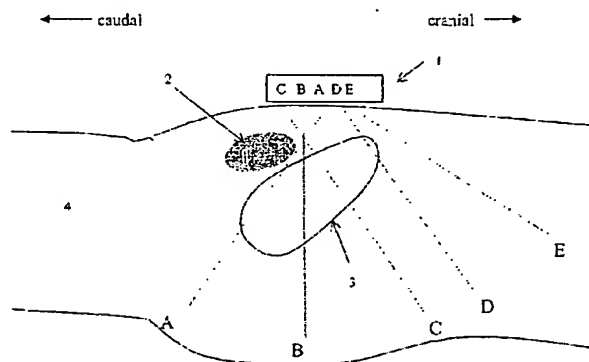
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **INSTANTANEOUS ULTRASONIC MEASUREMENT OF BLADDER VOLUME**



(57) Abstract: An apparatus and methods to quantify the volume of urine in a human bladder with a limited number of acoustic beams is disclosed. In a first version the apparatus is composed of a transducers assembly that transmits a plurality of narrow ultrasound beams in different directions towards the bladder and receives the returning ultrasound signals; a receiver detector for processing the returned signals; an analog-to-digital converter; a memory to store the digitized data and a volume display allowing to define the optimal position of the transducer assembly. The apparatus also includes a signal processing software that automatically determines the bladder Depth D and Height H and computes the volume of urine using an empirical formula corrected by specific, empirically measured, filling dependant correction factors. In a second version a single wide angle ultrasound beam transducer transmitting ultrasound signals at fundamental frequency is used to quantify the urine volume. Return signals originating from a depth beyond the usual position of the posterior wall depth of a filled bladder are analyzed for presence of higher harmonic signals which in turn are related to presence or absence of urine. Both methods or a combination thereof can be used as a simple warning device for presence of residual urine after voiding or indicate the presence of a critical bladder urine filling level.

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